

In the claims

Cancel claims 19-40.

Amend claims 1-18 where indicated.

1 1. (Currently Amended) A magnetic head assembly, which has an air bearing
2 surface (ABS), comprising:

3 a spin valve sensor, nonmagnetic first and second read gap layers, [[a]] ferromagnetic
4 first and second shield layer and a ferromagnetic first pole piece layer, layers;

5 the spin valve sensor being located between the first and second read gap layers and the
6 first and second read gap layers being located between the first and second shield layer and the
7 first pole piece layer, layers;

8 the spin valve sensor having a pinned layer which has a magnetic moment that is pinned
9 by a pinning layer in a direction perpendicular to the ABS;

10 [[a]] ferromagnetic first and second pole piece [[layer]] layers and a nonmagnetic write
11 gap layer wherein the second pole piece layer is separated from the first pole piece layer by the
12 write gap layer at the ABS and is connected to the first pole piece layer at a back gap;

13 each of the first and second shield [[layer]] layers and the first and second pole piece
14 layers having a magnetic easy axis that is directed parallel to the ABS;

15 an insulation stack with a coil layer embedded therein located between the first and
16 second pole piece layers wherein the insulation stack includes at least one baked photoresist
17 insulation layer that has been formed in part by heating at a preselected annealing temperature
18 in the presence of a magnetic field that is directed perpendicular to said ABS;

19 the insulation stack having been formed subsequent to said sensor and at least the first
20 pole piece layer and/or second shield layer having not been subjected to annealing in the
21 presence of a magnetic field directed parallel to said ABS before said heating of the layer of the
22 insulation stack; and

23 at least one of the first and second shield layers and the first and second pole piece layers
24 comprising NiFeCo-O-N or NiFeCo-N.

1 2. (Original) A magnetic head assembly as described in claim 1 wherein the
2 second shield layer and the first pole piece layer are a common layer.

1 3. (Original) A magnetic head assembly as described in claim 1 wherein the
2 second shield layer and the first pole piece layer are separate layers and are separated by a
3 nonmagnetic insulative isolation layer.

1 4. (Original) A magnetic head assembly as described in claim 1 wherein the
2 second shield layer comprises NiFeCo-N.

1 5. (Original) A magnetic head assembly as described in claim 1 wherein the
2 second pole piece layer comprises a laminated layer of NiFeCo-O-N films with interlayer films
3 of Al₂O₃ or SiO₂.

1 6. (Original) A magnetic head assembly as described in claim 5 including:
2 a seed layer comprising NiFeCo-O-N;
3 the second pole piece layer being directly on the seed layer; and
4 the seed layer having higher O and N contents than the NiFeCo-O-N of the second pole
5 piece layer.

1 7. (Original) A magnetic head assembly as described in claim 6 including:
2 a bottom layer of SiO₂; and
3 the seed layer being located between the bottom layer and the second shield layer.

1 8. (Original) A magnetic head assembly as described in claim 7 wherein the
2 laminated layer includes four NiFeCo-O-N films that are each substantially 4500 Å thick.

1 9. (Original) A magnetic head assembly as described in claim 8 wherein the
2 second shield layer comprises NiFeCo-N.

1 10. (Currently Amended) A magnetic disk drive including a magnetic head
2 assembly having an air bearing surface (ABS), the disk drive comprising:
3 the magnetic head assembly including:
4 a spin valve sensor, first and second nonmagnetic first and second read gap
5 layers, ~~[[a]] ferromagnetic first and second shield layer and a ferromagnetic first pole~~
6 ~~piece layer;~~ layers;
7 the spin valve sensor being located between the first and second read gap layers
8 and the first and second read gap layers being located between the first and second shield
9 ~~layer and the first pole piece layer;~~ layers;
10 the spin valve sensor having a pinned layer which has a magnetic moment that
11 is pinned by a pinning layer in a direction perpendicular to the ABS;
12 [[a]] ferromagnetic first and second pole piece ~~[[layer]]~~ layers and a write gap
13 layer wherein the second pole piece layer is separated from the first pole piece layer by
14 the write gap layer at the ABS and is connected to the first pole piece layer at a back gap;
15 each of the first and second shield ~~[[layer]]~~ layers and the first and second pole
16 piece layers having an easy axis that is directed parallel to the ABS;
17 an insulation stack with a coil layer embedded therein located between the first
18 and second pole piece layers wherein the insulation stack includes at least one baked
19 photoresist insulation layer that has been formed in part by heating at a preselected
20 annealing temperature in the presence of a magnetic field that is directed perpendicular
21 to said ABS; and
22 the insulation stack having been formed subsequent to said sensor and at least the
23 first pole piece layer and/or second shield layer having not been subjected to annealing
24 in the presence of a magnetic field directed parallel to the ABS before said heating of the
25 layer of the insulation stack; and
26 at least one of the first and second shield layers and the first and second pole
27 piece layers comprising NiFeCo-O-N or NiFeCo-N;
28 a housing;
29 a magnetic disk rotatably supported in the housing;

30 a support mounted in the housing for supporting the magnetic head with its ABS site
31 facing the magnetic disk so that the magnetic head is in a transducing relationship with the
32 magnetic disk;

33 spindle motor for rotating the magnetic disk;

34 an actuator means connected to the support for moving the magnetic head to multiple
35 positions with respect to said magnetic disk; and

36 a processor connected to the magnetic head, to the spindle motor and to the actuator for
37 exchanging signals with the magnetic head, for controlling movement of the magnetic disk and
38 for controlling the position of the magnetic head.

1 11. (Original) A magnetic disk drive as described in claim 10 wherein the second
2 shield layer and the first pole piece layer are a common layer.

1 12. (Original) A magnetic disk drive as described in claim 10 wherein the second
2 shield layer and the first pole piece layer are separate layers and are separated by a nonmagnetic
3 insulative isolation layer.

1 13. (Original) A magnetic disk drive as described in claim 10 wherein the second
2 shield layer comprises NiFeCo-N.

1 14. (Original) A magnetic disk drive as described in claim 10 wherein the second
2 pole piece layer comprises a laminated layer of NiFeCo-O-N films with interlayer films of Al_2O_3
3 or SiO_2 .

1 15. (Original) A magnetic disk drive as described in claim 14 including:
2 a seed layer comprising NiFeCo-O-N;
3 the second pole piece layer being directly on the seed layer; and
4 the seed layer having higher O_2 and N_2 contents than the NiFeCo-O-N of the second pole
5 piece layer.

1 16. (Original) A magnetic disk drive as described in claim 15 including:
2 a bottom layer of SiO₂; and
3 the seed layer being located between the bottom layer and the second shield layer.

1 17. (Original) A magnetic disk drive as described in claim 16 wherein the
2 laminated layer includes four NiFeCo-O-N films that are each substantially 4500 Å thick.

1 18. (Original) A magnetic disk drive as described in claim 17 wherein the second
2 shield layer comprises NiFeCo-N.

19.-40. (Canceled)

Add new claims 41-52.

1 41. (New) A magnetic head assembly, which has an air bearing surface (ABS),
2 comprising:
3 a spin valve sensor, nonmagnetic first and second read gap layers, a ferromagnetic first
4 shield layer and a ferromagnetic first pole piece layer;
5 the spin valve sensor being located between the first and second read gap layers and the
6 first and second read gap layers being located between the first shield layer and the first pole
7 piece layer;
8 the spin valve sensor having a pinned layer which has a magnetic moment that is pinned
9 by a pinning layer in a direction perpendicular to the ABS;
10 a ferromagnetic second pole piece layer and a nonmagnetic write gap layer wherein the
11 second pole piece layer is separated from the first pole piece layer by the write gap layer at the
12 ABS and is connected to the first pole piece layer at a back gap;
13 each of the first shield layer and the first and second pole piece layers having a magnetic
14 easy axis that is directed parallel to the ABS and to a greatest thin film surface of multiple thin
15 film surfaces of each respective layer so as to have in-plane anisotropy;

16 an insulation stack with a coil layer embedded therein located between the first and
17 second pole piece layers wherein the insulation stack includes at least one baked photoresist
18 insulation layer; and

19 at least one of the first shield layer and the first and second pole piece layers comprising
20 NiFeCo-O-N or NiFeCo-N and having an in-plane uniaxial anisotropy field H_K from 2.6 Oe to
21 6.0 Oe.

1 42. (New) A magnetic head assembly as described in claim 41 wherein the second
2 shield layer comprises NiFeCo-N.

1 43. (New) A magnetic head assembly as described in claim 41 wherein the second
2 pole piece layer comprises a laminated layer of NiFeCo-O-N films with interlayer films of Al_2O_3
3 or SiO_2 .

1 44. (New) A magnetic head assembly as described in claim 43 including:
2 a seed layer comprising NiFeCo-O-N;
3 the second pole piece layer being directly on the seed layer; and
4 the seed layer having higher O and N contents than the NiFeCo-O-N of the second pole
5 piece layer.

1 45. (New) A magnetic head assembly as described in claim 44 including:
2 a bottom layer of SiO_2 ; and
3 the seed layer being located between the bottom layer and the second shield layer.

1 46. (New) A magnetic head assembly as described in claim 45 wherein the
2 laminated layer includes four NiFeCo-O-N films that are each substantially 4500Å thick.

1 47. (New) A magnetic disk drive including a magnetic head assembly having an
2 air bearing surface (ABS), the disk drive comprising:
3 the magnetic head assembly including:
4 a spin valve sensor, first and second nonmagnetic first and second read gap
5 layers, a ferromagnetic first shield layer and a ferromagnetic first pole piece layer;

6 the spin valve sensor being located between the first and second read gap layers
7 and the first and second read gap layers being located between the first shield layer and
8 the first pole piece layer;

9 the spin valve sensor having a pinned layer which has a magnetic moment that
10 is pinned by a pinning layer in a direction perpendicular to the ABS;

11 a ferromagnetic second pole piece layer and a write gap layer wherein the second
12 pole piece layer is separated from the first pole piece layer by the write gap layer at the
13 ABS and is connected to the first pole piece layer at a back gap;

14 each of the first shield layer and the first and second pole piece layers having an
15 easy axis that is directed parallel to the ABS and to a greatest thin film surface of
16 multiple thin film surfaces of each respective layer so as to have in-plane anisotropy;

17 an insulation stack with a coil layer embedded therein located between the first
18 and second pole piece layers wherein the insulation stack includes at least one baked
19 photoresist insulation layer; and

20 at least one of the first shield layer and the first and second pole piece layers
21 comprising NiFeCo-O-N or NiFeCo-N and having an in-plane uniaxial anisotropy field
22 H_K from 2.6 Oe to 6.0 Oe;

23 a housing;

24 a magnetic disk rotatably supported in the housing;

25 a support mounted in the housing for supporting the magnetic head with its ABS site
26 facing the magnetic disk so that the magnetic head is in a transducing relationship with the
27 magnetic disk;

28 spindle motor for rotating the magnetic disk;

29 an actuator means connected to the support for moving the magnetic head to multiple
30 positions with respect to said magnetic disk; and

31 a processor connected to the magnetic head, to the spindle motor and to the actuator for
32 exchanging signals with the magnetic head, for controlling movement of the magnetic disk and
33 for controlling the position of the magnetic head.

1 48. (New) A magnetic disk drive as described in claim 47 wherein the second
2 shield layer comprises NiFeCo-N.

1 49. (New) A magnetic disk drive as described in claim 47 wherein the second pole
2 piece layer comprises a laminated layer of NiFeCo-O-N films with interlayer films of Al₂O₃ or
3 SiO₂.

1 50. (New) A magnetic disk drive as described in claim 49 including:
2 a seed layer comprising NiFeCo-O-N;
3 the second pole piece layer being directly on the seed layer; and
4 the seed layer having higher O₂ and N₂ contents than the NiFeCo-O-N of the second pole
5 piece layer.

1 51. (New) A magnetic disk drive as described in claim 50 including:
2 a bottom layer of SiO₂; and
3 the seed layer being located between the bottom layer and the second shield layer.

1 52. (New) A magnetic disk drive as described in claim 51 wherein the laminated
2 layer includes four NiFeCo-O-N films that are each substantially 4500Å thick.